

WHAT IS CLAIMED IS:

1. A color filter substrate for use in a display device including pixels that are arranged in a matrix so as to define columns of pixels in a column direction and rows of pixels in a row direction, respectively, the color filter substrate comprising:

a plurality of color filters, each of which is associated with one of the pixels and which include at least two A-color filters in a first color and at least two B-color filters in a second color; wherein

each of said rows of pixels is associated with a group of color filters including at least one of the A-color filters and at least one of the B-color filters;

each of said A-color filters has a first side and a second side that define a width thereof in the row direction;

each of said B-color filters has a first side and a second side that define a width thereof in the row direction, and

an area  $S_A$  of each of said A-color filters is greater than an area  $S_B$  of each of said B-color filters; and

the first side of each of said B-color filters has at least one first-type recess, the at least one first-type recess being formed so as to extend from the first side toward the second side thereof in the row direction, and the first side of each of said B-color filters is substantially the same

as the first side of each of said A-color filters except that the at least one first-type recess is formed thereon.

2. The color filter substrate of claim 1, wherein a sum MB1 of the lengths of the at least one first-type recess of each of said B-color filters as measured in the column direction is substantially constant in the row direction.

3. The color filter substrate of claim 1, wherein an +x direction is defined as extending from the second side toward the first side of each of said A-color filters in the row direction, LA1 is a total length of at least a portion of the first side of each of said A-color filters at the end of the +x direction, and MB1 is the sum of the lengths of the at least one first-type recess of each of said B-color filters as measured in the column direction, the color filter substrate satisfies the equation  $MB1/LA1 = (SA - SB)/SA$ .

4. The color filter substrate of claim 1, wherein the width of the at least one first-type recess in the row direction is substantially equal to or greater than an alignment margin in the row direction.

5. The color filter substrate of claim 1, wherein the second side of each of said B-color filters has at least one

second-type recess, the at least one second-type recess being formed so as to extend from the second side toward the first side thereof in the row direction, and the second side of each of said B-color filters is substantially the same as the second side of each of said A-color filters except that the at least one second-type recess is formed thereon.

6. The color filter substrate of claim 5, wherein a sum MB2 of the lengths of the at least one second-type recess of each of said B-color filters as measured in the column direction is substantially constant in the row direction.

7. The color filter substrate of claim 5, wherein an -x direction is defined as extending from the first side toward the second side of each of said A-color filters in the row direction, LA2 is the total length of at least a portion of the second side of each of said A-color filters at the end of the -x direction, and MB2 is the sum of the lengths of the at least one second-type recess of each of said B-color filters as measured in the column direction, the color filter substrate satisfies the equation  $MB2/LA2 = (SA - SB)/SA$ .

8. The color filter substrate of claim 5, wherein the width of the at least one second-type recess in the row direction is substantially equal to or greater than an

alignment margin in the row direction.

9. The color filter substrate of claim 1, wherein the color filters further include at least two C-color filters in a third color, which is different from the first color of the A-color filters or the second color of the B-color filters, each of said rows of pixels is associated with a group of color filters including not only at least one of the A-color filters and at least one of the B-color filters but also at least one of the C-color filters, each of said C-color filters has a first side and a second side that define a width in the row direction, an area  $SA$  of each said A-color filter, an area  $SB$  of each said B-color filter and an area  $SC$  of each said C-color filter satisfy the inequalities  $SA > SB$  and  $SA > SC$ , and the first side of each of said C-color filters has at least one third-type recess, the at least one third-type recess being formed so as to extend from the first side toward the second side thereof in the row direction, and the first side of each of said C-color filters is substantially the same as the first side of each of said A-color filters except that the at least one third-type recess is formed thereon.

10. The color filter substrate of claim 9, wherein a sum  $MC1$  of the lengths of the at least one third-type recess of each of said C-color filters as measured in the column

direction is substantially constant in the row direction.

11. The color filter substrate of claim 9, wherein an +x direction is defined as extending from the second side toward the first side of each of said A-color filters in the row direction, LA1 is the total length of at least a portion of the first side of each of said A-color filters at the end of the +x direction, and MC1 is the sum of the lengths of the at least one third-type recess of each of said C-color filters as measured in the column direction, the color filter substrate satisfies the equation  $MC1/LA1=(SA-SC)/SA$ .

12. The color filter substrate of claim 9, wherein the width of the at least one third-type recess in the row direction is substantially equal to or greater than an alignment margin in the row direction.

13. The color filter substrate of claim 9, wherein the color filters further include at least two D-color filters in a fourth color, which is different from the first color of the A-color filters, the second color of the B-color filters or the third color of the C-color filters, each of said rows of pixels is associated with a group of color filters including not only at least one of the A-color filters, at least one of the B-color filters and at least one of the C-color filters

but also at least one of the D-color filters, each of said D-color filters has a first side and a second side that define a width thereof in the row direction, an area SA of each of said A-color filters, an area SB of each of said B-color filters, an area SC of each of said C-color filters and an area SD of each of said D-color filters satisfy the inequalities  $SA > SB$ ,  $SA > SC$  and  $SA > SD$ , and the first side of each of said D-color filters has at least one fourth-type recess, the at least one fourth-type recess being formed so as to extend from the first side toward the second side thereof in the row direction, and the first side of each of said D-color filters is substantially the same as the first side of each of said A-color filters except that the at least one fourth-type recess is formed thereon.

14. The color filter substrate of claim 13, wherein a sum MD1 of the lengths of the at least one fourth-type recess of each said D-color filter as measured in the column direction is substantially constant in the row direction.

15. The color filter substrate of claim 13, wherein an +x direction is defined as extending from the second side toward the first side of each of said A-color filters in the row direction, LA1 is the total length of at least a portion of the first side of each of said A-color filters at the end

of the +x direction, and MD1 is the sum of the lengths of the at least one fourth-type recess of each of said D-color filters as measured in the column direction, the color filter substrate satisfies the equation  $MD1/LA1=(SA-SD)/SA$ .

16. The color filter substrate of claim 13, wherein the width of the at least one fourth-type recess in the row direction is substantially equal to or greater than an alignment margin in the row direction.

17. The color filter substrate of claim 1, wherein the rows of pixels include a first row and a second row, which are adjacent to each other in the column direction, and one of the A-color filters associated with the first row, another one of the A-color filters associated with the second row, and a linking portion for linking together the A-color filters associated with the first and second rows define a columnar A-color filter.

18. The color filter substrate of claim 17, wherein the columnar A-color filter has a first side and a second side that define a width thereof in the row direction, the columnar A-color filter has a recess on the second side thereof, the second side of the linking portion is included in a bottom edge of the recess provided for the columnar A-color filter,

and the length of the recess on the second side of the columnar A-color filter as measured in the column direction is substantially constant in the row direction.

19. The color filter substrate of claim 17, wherein the columnar A-color filter has a first side and a second side that define a width thereof in the row direction, the columnar A-color filter has a recess on each of the first and second sides thereof, the second side of the linking portion is included in a bottom edge of the recess provided on the second side of the columnar A-color filter, the upper edge of the recess provided on the first side of the columnar A-color filter is leveled in the column direction with the lower edge of the recess provided on the second side of the columnar A-color filter, the width of the recess provided on the first side of the columnar A-color filter as measured in the row direction is substantially equal to that of the recess provided on the second side thereof, and each of the lengths of the recesses on the first and second sides of the columnar A-color filter as measured in the column direction is substantially constant in the row direction.

20. The color filter substrate of claim 19, wherein as measured in the column direction, the length of the recess provided on the first side of the columnar A-color filter is



substantially equal to or greater than that of the linking portion.

21. The color filter substrate of claim 17, wherein the rows of pixels include the first and second rows that are adjacent to each other in the column direction, one of the B-color filters associated with the first row, another one of the B-color filters associated with the second row, and a linking portion for linking together the B-color filters associated with the first and second rows define a columnar B-color filter.

22. The color filter substrate of claim 17, wherein the color filters include at least two C-color filters in a third color, which is different from the first color of the A-color filters or the second color of the B-color filters, each of said rows of pixels is associated with a group of color filters including not only at least one of the A-color filters and at least one of the B-color filters but also at least one of the C-color filters, each of said C-color filters has a first side and a second side that define a width thereof in the row direction, an area  $SA$  of each of said A-color filters, an area  $SB$  of each said B-color filter and an area  $SC$  of each said C-color filter satisfy the inequalities  $SA > SB$  and  $SA > SC$ , the first side of each of said C-color filters

has at least one third-type recess, the at least one third-type recess being formed so as to extend from the first side toward the second side thereof in the row direction, and the first side of each of said C-color filters is substantially the same as the first side of each of said A-color filters except that the at least one third-type recess is formed thereon, the rows of pixels include the first and second rows that are adjacent to each other in the column direction, and one of the C-color filters associated with the first row, another one of the C-color filters associated with the second row, and a linking portion for linking together the C-color filters associated with the first and second rows define a columnar C-color filter.

23. The color filter substrate of claim 17, wherein the color filters include at least two D-color filters in a fourth color, which is different from the first color of the A-color filters, the second color of the B-color filters or the third color of the C-color filters, each of said row of pixels is associated with a group of color filters including not only at least one of the A-color filters, at least one of the B-color filters and at least one of the C-color filters but also at least one of the D-color filters, each of said D-color filters has a first side and a second side that define a width thereof in the row direction, an area SA of each of said A-color

filters, an area SB of each of said B-color filters, an area SC of each of said C-color filters and an area SD of each of said D-color filters satisfy the inequalities  $SA > SB$ ,  $SA > SC$  and  $SA > SD$ , the first side of each of said D-color filters has at least one fourth-type recess, the at least one fourth-type recess being formed so as to extend from the first side toward the second side thereof in the row direction, and the first side of each of said D-color filters is substantially the same as the first side of each of said A-color filters except that the at least one fourth-type recess is formed thereon, the rows of pixels include the first and second rows that are adjacent to each other in the column direction, and one of the D-color filters associated with the first row, another one of the D-color filters associated with the second row, and a linking portion for linking together the D-color filters associated with the first and second rows define a columnar D-color filter.

24. A color filter substrate for use in a display device including pixels that are arranged in a matrix so as to define columns of pixels in a column direction and rows of pixels in a row direction, respectively, the color filter substrate comprising:

a plurality of color filters, each of which is associated with one of the pixels and which include at least two A-color

filters in a first color and at least two B-color filters in a second color; wherein

each of said rows of pixels is associated with a group of color filters including at least one of the A-color filters and at least one of the B-color filters;

an area  $S_A$  of each of said A-color filters is greater than an area  $S_B$  of each of said B-color filters;

each of said A-color filters has a first side and a second side that define a width thereof in the row direction and a third side and a fourth side that define a length thereof in the column direction;

wherein each of said B-color filters has a first side and a second side that define a width thereof in the row direction and a third side and a fourth side that define a length thereof in the column direction;

a +x direction is defined as extending from the second side toward the first side of each of said color filters in the row direction;

a +y direction is defined as extending from the fourth side toward the third side of each of said color filters in the column direction;

$L^0_{(B1)}$  is defined as a length of at least a portion of the first side of each of said B-color filters as measured in the column direction except for a length of a recess in the column direction if the recess is provided at the same position for

the B-color filter and an adjacent one of the A-color filters;

$L^0_{(B2)}$  is defined as a length of at least a portion of the second side of each of said B-color filters as measured in the column direction except for a length of another recess in the column direction if the recess is provided at the same position for the B-color filter and the adjacent A-color filter; and

$L^0_{(B3)}$  is defined as a width of at least a portion of the third side of each of said B-color filters as measured in the row direction except for a width of a recess in the row direction if the recess is provided at the same position for the B-color filter and the adjacent A-color filter;

$L^0_{(B4)}$  is defined as a width of at least a portion of the fourth side of each of said B-color filters as measured in the row direction except for a width of another recess in the row direction if the recess is provided at the same position for the B-color filter and the adjacent A-color filter;

as measured in the column direction,  $L_{(B1)}$  is defined as a total length of at least a portion of the first side of each of said B-color filters at the end of the +x direction, and  $L_{(B2)}$  is defined as a total length of at least a portion of the second side of each of said B-color filters at the end of the -x direction;

as measured in the row direction,  $L_{(B3)}$  is defined as a total width of at least a portion of the third side of each of

said B-color filters at the end of the +y direction, and  $L_{(B4)}$  is defined as a total width of at least a portion of the fourth side of each of said B-color filters at the end of the -y direction;

if at least one of the first, second, third and fourth sides of each of said B-color filters has a recess, then at least one of the inequalities  $L^0_{(B1)} > L_{(B1)}$ ,  $L^0_{(B2)} > L_{(B2)}$ ,  $L^0_{(B3)} > L_{(B3)}$  and  $L^0_{(B4)} > L_{(B4)}$  is satisfied.

25. The color filter substrate of claim 24, wherein the first side of each of said B-color filters has the recess, the length of the recess in the column direction is substantially constant in the row direction, and  $L_{(B1)} / L_{(A1)} = SB / SA$  is satisfied.

26. The color filter substrate of claim 24, wherein the second side of each of said B-color filters has the recess, the length of the recess in the column direction is substantially constant in the row direction, and  $L_{(B2)} / L_{(A2)} = SB / SA$  is satisfied.

27. The color filter substrate of claim 24, wherein the third side of each of said B-color filters has the recess, the width of the recess in the row direction is substantially constant in the column direction, and  $L_{(B3)} / L_{(A3)} = SB / SA$  is

satisfied.

28. The color filter substrate of claim 24, wherein the fourth side of each of said B-color filters has the recess, the width of the recess in the row direction is substantially constant in the column direction, and  $L_{(B4)} / L_{(A4)} = SB / SA$  is satisfied.

29. The color filter substrate of claim 24, wherein each of the first, second, third and fourth sides of each of said B-color filters has the recess and all of the inequalities  $L^0_{(B1)} > L_{(B1)}$ ,  $L^0_{(B2)} > L_{(B2)}$ ,  $L^0_{(B3)} > L_{(B3)}$  and  $L^0_{(B4)} > L_{(B4)}$  are satisfied.

30. The color filter substrate of claim 24, wherein  $L_{(B1)} / L_{(A1)} = L_{(B2)} / L_{(A2)} = L_{(B3)} / L_{(A3)} = L_{(B4)} / L_{(A4)} = SB / SA$  is satisfied.

31. The color filter substrate of claim 24, wherein the rows of pixels include a first row and a second row, which are adjacent to each other in the column direction, and one of the A-color filters associated with the first row, another one of the A-color filters associated with the second row, and a linking portion for linking together the A-color filters associated with the first and second rows define a columnar A-color filter.

32. The color filter substrate of claim 31, wherein the columnar A-color filter has a first side and a second side that define a width thereof in the row direction, the columnar A-color filter has a recess on the second side thereof, the second side of the linking portion is included in a bottom edge of the recess provided for the columnar A-color filter, and the length of the recess on the second side of the columnar A-color filter as measured in the column direction is substantially constant in the row direction.

33. The color filter substrate of claim 31, wherein the columnar A-color filter has a first side and a second side that define a width thereof in the row direction, the columnar A-color filter has a recess on each of the first and second sides thereof, the second side of the linking portion is included in a bottom edge of the recess provided on the second side of the columnar A-color filter, the upper edge of the recess provided on the first side of the columnar A-color filter is leveled in the column direction with the lower edge of the recess provided on the second side of the columnar A-color filter, the width of the recess provided on the first side of the columnar A-color filter as measured in the row direction is substantially equal to that of the recess provided on the second side thereof, and each of the lengths



of the recesses on the first and second sides of the columnar A-color filter as measured in the column direction is substantially constant in the row direction.

34. The color filter substrate of claim 33, wherein as measured in the column direction, the length of the recess provided on the first side of the columnar A-color filter is substantially equal to or greater than that of the linking portion.

35. A display device comprising the color filter substrate of claim 1.

36. A display device comprising the color filter substrate of claim 24.